BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Engineering Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Diploma in Mechanical Engineering Pearson BTEC International Level 3 Diploma in Digital Engineering Pearson BTEC International Level 3 Diploma in Manufacturing Engineering Pearson BTEC International Level 3 Diploma in Aeronautical Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Mechanical Engineering Pearson BTEC International Level 3 Extended Diploma in Digital Engineering Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering Pearson BTEC International Level 3 Extended Diploma in Aeronautical Engineering
Unit number and title	**Unit 43: Manufacturing Computer Numerical Control Machining Processes**
Learning aim(s)	**B:** Develop a Computer Numerical Control set-up sheet and part program to manufacture a component safely **C:** Carry out Computer Numerical Control machining processes to manufacture a component safely
Assignment title	Using CNC machinery to manufacture a component
Assessor	
Issue date	
Hand in deadline	
Vocational Scenario or Context	You are working as a trainee CNC operator for a company that manufactures complex components that would be difficult to manufacture using traditional methods. Your supervisor is pleased with your level of understanding associated with how CNC machines are controlled and programmed, and would now like you to demonstrate that you can develop a CNC part-program, simulate the program and then manufacture the component. A customer is waiting for the said component.

Task 1	You have been asked to demonstrate the practical skills needed to program, set-up and use a CNC machine to manufacture a component that requires at least six complex machining processes and at least three different cutting tools. You will be provided with a drawing. **To do this:** You will generate a portfolio of evidence in a log book that shows that you can create a CNC set-up sheet and part program, simulate the program and then carry out a CNC machining activity to manufacture the component safely and accurately. Your CNC machine tool set-up sheet must include detailed but concise and accurate information about: • Tooling parameters, such as feed rates, cutting speeds (including RPM calculations), roughing operations, finishing operations, tooling diameters, cutter compensation, tooling materials and tool numbers • Component parameters, including calculations, materials and the suitability of the machine to achieve the required tolerances and surface textures • Work holding methods/parameters • Tool change positions, tool mounting and tool offsets • Machine and program datums • Safe positioning for machining • Sustainability considerations, including the separation/disposal of materials and the use of resources. **You then need to:** • Develop a part program to manufacture a component safely and accurately, by using auxiliary functions, CNC codes and sub-routines/programs • Simulate the part program/machining process using graphical software to check for syntax/logical errors and the tool cutter paths • Modify the program as required to make it more efficient/accurate • Set-up safely the CNC machine, including the work holding devices and machine parameters, and simulate the physical machining of the component, correcting any syntax/logical errors and editing the part program to make sure it is as effective/efficient as it can be • Undertake quality control checks for dimensional tolerance, surface texture, angles and also hole details and make further adjustments to the work holding and machining parameters as required to improve the effectiveness/efficiency of the machining process • Manufacture the component safely, record what was done and then remove the swarf and the workpiece from the machine

Checklist of evidence required	Preparation activities and documents (contained in a log book) prior to CNC machining a component, to include: machine tool set-up sheet and a computer part program, and simulation of the program. Input the part program and set up the CNC machine, to produce a component, using multiple tooling. Quality control checks recorded on documentation to verify that the component meets the specification and is fit for the intended purpose. The evidence for the practical activity should include learner observation records/witness statements and annotated photographs/drawings.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
43/BC.D2	Optimise the processes to effectively and efficiently develop and manufacture safely a component using at least six complex CNC processes and at least three different cutting tools
43/B.M2	Produce an accurate machine tool set-up sheet for a component using at least six complex CNC processes and at least three different cutting tools
43/B.M3	Create a part program to machine a component safely and efficiently, using at least six complex CNC processes and at least three different cutting tools and simulate for any syntax and logical errors
43/C.M4	Manufacture accurately, a component using at least six complex CNC processes and at least three different cutting tools, incorporating improvements from the simulation
43/B.P2	Create a machine tool set-up sheet for a component using at least six complex CNC processes and at least three different cutting tools
43/B.P3	Create a part program to machine a component safely using at least six complex CNC processes and at least three different cutting tools and simulate for any syntax and logical errors
43/C.P4	Simulate the CNC machining of a component safely, correcting any syntax and logical errors
43/C.P5	Manufacture a component safely using at least six complex CNC processes and at least three different cutting tools

Sources of information to support you with this Assignment	**Books** Smid P; CNC Programming Handbook, 3rd Edition (Industrial Press, 2007); ISBN 9780831133474. Smid P; CNC setup for Milling and Turning: Mastering CNC Control Systems (Industrial Press Inc., 2010) ISBN 9780831133504 **Websites** haas.co.uk website.denford.ltd.uk techsoft.co.uk fanuc.eu/uk/en heidenhain.co.uk